

PLANT CONSERVATION CONCERNS IN
RHODE ISLAND—A REAPPRAISAL

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In 1978, the United States Fish and Wildlife Service published *Rare and Endangered Vascular Plant Species in Rhode Island*, authored by George Church and Richard Champlin. A total of 120 species were listed in the publication using the criterion of "rare" to mean five or fewer field stations. The list was initially derived through analysis of specimens housed at the herbaria of the New England Botanical Club and Brown University with further revisions based on field investigations.

Using the Church and Champlin list as a basis for study, along with subsequent publications including that of Stuckey (1979), a joint venture was initiated in 1979 between The Nature Conservancy and the Rhode Island Natural Heritage Program of the Department of Environmental Management to document the distribution of rare native vascular plants in the state. This effort, now in its 9th year, has been instrumental in deriving a clearer picture of the state's uncommon flora. Currently, 263 species and subordinate taxa are being tracked by the Natural Heritage Program. This list includes plants under the following designations:

State Endangered (53 taxa). Defined as native taxa in imminent danger of extirpation from Rhode Island under the following criteria:

1. A taxon currently listed or proposed by the U.S. Fish and Wildlife Service as Federally endangered or threatened.
2. A taxon with 1 or 2 known or estimated total occurrences in the state.
3. A taxon apparently globally rare or threatened, estimated to occur at approximately 100 or fewer sites range-wide.

The 53 taxa defined under this category are currently listed under the Rhode Island State Endangered Species Act, and thus receive protection from widespread collection.

State Threatened (60 taxa). Native taxa which are likely to become state endangered in the future if current trends in habitat loss or other detrimental factors remain unchanged. These taxa meet one or more of the following criteria:

1. A taxon with 3 to 5 known or estimated occurrences in the state.
2. A taxon with more than 5 known or estimated occurrences in the state, but especially vulnerable to habitat loss.

State Interest (65 taxa). Native taxa not considered to be state endangered or threatened at the present time, occurring at 6 to 10 sites in the state.

Special Concern (39 taxa). Taxa which do not qualify under other categories but are additionally listed due to various factors of rarity and/or vulnerability.

State Extirpated (46 taxa). Taxa which have been documented for the state during the last 100 years, but for which no current occurrences are known.

The increase in the number of species listed as endangered, threatened, or otherwise uncommon, is partially due to more comprehensive work on less studied taxa, especially the Cyperaceae with 24 newly listed species including four recently discovered additions to the state flora. These species are:

Carex walteriana Bailey (Rawinski & Raithel 7899, NEBC)
Scirpus longii Fern. (Rawinski, Enser & Caljouw 6832, NEBC)
Scirpus etuberculatus (Steud.) Kuntze (Raithel s.n., NEBC)
Scleria pauciflora Muhl. (Caljouw, Enser & Zaremba 87-342, NEBC).

DESCRIPTION OF INVESTIGATIONS

Initially, the Natural Heritage Program prepared a list of target plant species based on information garnered from previously published materials. Further analysis of herbarium specimens and discussions with knowledgeable botanists refined the list allowing a prioritization of field efforts. Initial field time was spent relocating historic stations which also aided in the identification of important plant community types which should be investigated for new records. These communities targeted as important rare plant habitats are assembled into two major groups based on their regional distribution and significance. Following are brief descriptions of these community types and highlights of those special plants found in each.

GROUP I. REGIONALLY IMPORTANT PLANT COMMUNITIES
AND RARE PLANTS

Community types considered important within the southern New England region, containing associations and species which are rare throughout the region, and also includes species rare rangewide. These types with primary examples are as follows:

A. Coastal Plain Pondshores

Original identification of coastal plain pondshores was made in the early 1900's by regional botanists including J. F. Collins and M. L. Fernald. Characteristic species such as *Sabatia kenedyana* Fern., *Coreopsis rosea* L., and *Sagittaria teres* S. Wats. are documented in herbaria from stations in Providence and Kent Counties during this period. These sites, the most notable of which was Gorton's Pond in Warwick, have been highly impacted by urbanization and heavy recreational use and no longer serve as viable habitats for these species. In addition, brief forays by these noted botanists into Washington County unveiled other locations for coastal plain species. Pondshores supporting these rare species occur on moraine and outwash plains less than 10 miles inland from the Atlantic Ocean. These early indications of potentially important habitats served as a guide for recent surveys, including a report by Sorrie (1981) regarding the distribution of *Eupatorium leucolepis* var. *novae-angliae* Fern., an endemic to southern New England. Additional work, including that of G. Tucker (pers. comm., 1979), served as a basis for Natural Heritage Program surveys over a wider portion of the Washington County area.

The Matunuck Hills area, consisting of ten small ponds on approximately 1200 acres of the Charlestown recessional moraine, is the state's best example of this important community and rare plant habitat. The seasonally fluctuating water levels of these freshwater ponds provide the ephemeral sandy shorelines required for the emergence of many rare plants. Rare taxa documented from this area include *Sagittaria teres* S. Wats., *Eleocharis tricostata* Torr., *Fuirena pumila* Torr., *Psilocarya scirpoides* Torr., *Rhynchospora macrostachya* Torr., *Scleria reticularis* Michx., *Hypericum adpressum* Barton, *Coreopsis rosea* L., *Eupatorium leucolepis* var. *novae-angliae* Fern., and *Scirpus etuberculatus* (Steud.) Kuntze. *S. etuberculatus* was first documented

in Rhode Island at this site in 1986 and is a major disjunction from the next closest station to the south on the Delaware coastal plain.

Additional coastal plain ponds in Washington County include Worden's Pond in South Kingstown and Deep Pond in Charlestown where the state's only current sites for *Sabatia kennedyana* L. and *Orontium aquaticum* L. are located.

Several key tracts in the Matunuck Hills area have been permanently protected through the combined efforts of The Nature Conservancy, The South Kingstown Land Trust, The Audubon Society of Rhode Island, the State, and the Town of South Kingstown.

B. Coastal Plain Quagmires

A second community type, seemingly coastal plain in distribution, occurs at wetlands characterized by stable water levels throughout the growing season and loose mucky or peaty substrates. Most of these ponds/wetlands are associated with *Chamaecyparis thyoides* (L.) BSP. swamps which maintain the constant water supply. Unlike open water areas associated with bogs, quagmires occur as shallow water areas with well defined emergent plant zones which are represented by two uncommon species, *Rhynchospora inundata* (Oakes) Fern., which is currently known from 4 sites in the state, and *Eleocharis equisetoides* (Ell.) T.

The distribution of *E. equisetoides* is of particular interest regionally. Historically recorded from approximately 5 sites in New England, including Massachusetts, Connecticut, and Rhode Island, only one site is extant in Connecticut, (L. Meyrhoff, pers. comm.), and none from Massachusetts. A total of 7 sites have been located in Rhode Island during the past three years. Distributed in three counties, these sites align along the western border of the state in the region underlain by a Hope Valley Alaskite Gniess bedrock. The reason for the apparent affinity of *E. equisetoides* to this geologic formation is not currently understood.

C. Morainic Grasslands

The distribution of this community type is limited to Block Island. This island, lying 12 miles south of the mainland, presents

an interesting puzzle on plant distribution. It is evident that large portions of the island were forested historically, based on observations of early historians and recent fossil pollen investigations, but major stands of woody vegetation were eliminated early in the island's settlement to provide fuel and building materials (Livermore, 1877). By the middle of the 18th century the island was converted into a vast agricultural plain, used primarily for grazing, with barely a tree visible on the landscape. Although the lack of historic information leaves much to conjecture, it is probable that some plants such as hickories and tree oaks were lost from the island due to this major alteration of the habitats (P. Dunwiddie, pers. comm.). Moreover, the relatively small size of the island which inhibits chance establishment of species, and the lack of habitat complexity results in a generally depauperate flora at the present.

The most noteworthy community type found on Block Island is the morainic grassland, areas of relatively small size (usually less than $\frac{1}{2}$ acre) which are generally limited to the exposed and xeric southeastern bluffs and hillsides where aggressive woody shrubs such as *Myrica pennsylvanica* Loisel. and *Viburnum dentatum* L. have failed to become established. These dry, sandy knolls serve as habitat for *Helianthemum dumosum* (Bickn.) F., *Aristida purpurascens* Poiret, *Polygala nuttallii* T. & G., and New England's only occurrence of *Chrysopsis mariana* (L.) Ell.

D. Acid Fens and Atlantic White Cedar Swamps

This significant coastal plain habitat located at the Great Swamp Wildlife Management Area in South Kingstown appears most similar to peatland communities found in the New Jersey pine barrens. The Great Swamp peatland appears in linear patterns of sedge-dominated vegetation interspersed with linear groves of *Chamaecyparis thyoides* (T. Rawinski, pers. comm.). The globally rare *Scirpus longii* and state endangered *Carex walteriana* were recently discovered here and occur as dominants along with *Carex exilis* Dew. in open fen areas. Cool, dark, and mossy *Chamaecyparis* groves provide habitat for the elusive *Carex collinsii* Nutt. at its only Rhode Island station. The area is protected as a state wildlife management area and the Heritage Program has made management recommendations for the area's long-term preservation.

E. Pitch Pine and Scrub Oak Barrens

Several thousand acres of this community type occur in Rhode Island, primarily within Kent and Washington Counties on sandy outwash soils. Dominates include *Pinus rigida* Mill., *Quercus ilicifolia* Wang., and *Q. prinoides* Willd. with the percent cover of each dependent on the fire and disturbance history at each site. Unusual state rare plants found in dry grassy openings within the barrens include *Lupinus perennis* L., *Tephrosia virginiana* (L.) Pers., and *Linum intercursum* Bickn. Although these areas are often lacking in high plant diversity, occasional small wet depressions or seeps can be found which support rare coastal plain flora. A recently located site of this description in Charlestown supports a wide diversity of species including the state endangered *Scleria triglomerata* Michx., *S. pauciflora*, and *Rhynchospora torreyana* Gray.

GROUP II. STATE IMPORTANT PLANT COMMUNITIES AND RARE PLANTS

Community types considered important in Rhode Island, containing associations and species rare within the state.

A. Calcareous Woodlands and Outcrops

Calcareous communities are restricted primarily to the town of Lincoln where unique plants have become established in an area associated with a relatively small outcropping of dolomitic marble. Diverse assemblages of plants thrive on marble ledges and in rich woods on fertile soils derived from the area's calcium-rich bedrock. This area serves as the only documented location statewide for calciphytic species including *Asplenium rhyzophyllum* L., *Pellaea atropurpurea* (L.) Link, *Galearis spectabilis* (L.) Raf., and *Parnassia glauca* Raf. along with other rare associates *Liparis lilifolia* (L.) Rich ex Lindl., *Platanthera hyperborea* (L.) Lindl., and *Actaea rubra* (Ait.) Willd. The area's unique flora has been well-documented since the turn of the century, and recent acquisitions by The Nature Conservancy will help in preserving one of the state's most botanically rich natural areas.

B. Acid Level Bogs

In Rhode Island, peat bogs occur at kettle holes, small depressions, or rarely as floating mats within larger bodies of water. This community supports species which are more commonly distributed in northern areas, but are considered rare in Rhode Island at the southern edge of their range. A primary example is the Bowdish Reservoir floating peat islands in Glocester which is the only station in the state for *Arceuthobium pusillum* Peck, *Kalmia polifolia* Wang., and *Andromeda glaucophylla* Link. The state has recently secured protection of the reservoir's shoreline, thereby protecting the floating islands.

ADDITIONAL RARE PLANTS

With the use of aerial photographs, soil, geologic, and topographic maps, communities such as calcareous forests, acid fens, bogs, coastal plain quagmires, and pitch pine barrens can be systematically identified and field checked for rare plant occurrences.

Field investigations are more difficult for those rare species which do not readily align themselves with a particular community type. *Agalinis acuta* Pennell is an example of such a species. Historically noted from five sites in Rhode Island, this globally rare species, now proposed for Federal listing, was last observed in Cumberland in 1941 (*E. J. Palmer s.n.*, NEBC). Its habitat appears to be sandy *Schizachyrium scoparium* (Michx.) Nash grassy openings. Recent intensive field surveys have proven unsuccessful; however, surveys will continue as much suitable habitat appears to remain for this elusive species.

Another species which has evaded field surveyors for many years is *Platanthera ciliaris* (L.) Lindl. Historically known from several occurrences in Washington County, the preferred habitat appears to be seasonally wet meadows, usually in association with *Aletris farinosa* L. Following a ten-year hiatus in records this species was reconfirmed in 1988 at one site in South Kingstown which is an active Christmas tree farm. Efforts are now proceeding to work with the private landowner to protect this rare orchid.

The globally rare *Carex polymorpha* Muhl. was historically known from two sites in Rhode Island, last seen in Barrington in 1911 (*M. L. Fernald, s.n.*, NEBC). A new record was discovered

in 1988 in the town of North Smithfield (T. Rawinski, pers. comm.). Again, the habitat for this species is difficult to characterize, but it appears to be found in seasonally wet meadows on fragipan soils.

PROTECTION OF RARE PLANTS

Approximately 50% of the 112 species listed under state endangered and threatened categories occur on sites which are considered to be protected by federal, state, town, and private conservation organizations. The level of protection afforded these sites varies with the goals of the managing agency. An important component of these protection efforts has been the Natural Areas Registry Program initiated in 1983 as a cooperative effort of The Nature Conservancy and the Natural Heritage Program. The Registry Program is designed to enlist the voluntary cooperation of private and public landowners in protecting significant natural areas. State endangered plants and threatened plant habitats have been a priority for protection from the onset. To date, as many as 60 landowners have agreed to protect important botanical resources found on their property.

Significant strides in land acquisition to protect rare and endangered plants were afforded through the state Open Space Bond Program. In 1985 and 1987, the voters of Rhode Island passed two bond referenda which provided over \$19 million for open space acquisition. This money is allocated as grants to municipalities, private conservation groups, and land trusts through an application process. Applications are reviewed by the Natural Heritage Preservation Commission and ranked according to a set of criteria which assess the natural values of land covered under an application. One criterion is the presence of rare and endangered species for which the Natural Heritage Program's list of target species and data base are used as the basis for making decisions. The Program also reviews the required management plans for areas, once they are protected by open space grants, to insure that proper stewardship is employed to maintain habitats identified for rare species.

Additional protection for rare plants is provided through State freshwater and coastal wetlands legislation. Approximately 50% of the species listed as state endangered and threatened are those

found on inland wetland habitats which fall under the scrutiny of the Rhode Island Freshwater Wetlands Act. This legislation mandates that alterations to wetlands shall require a permit, the allocation of which is governed by stringent regulations which identify the values associated with particular wetland sites. Larger wetlands are insured protection under this program, and sites may receive additional safeguard if identified as "unique," the designation of which is based on several important values including the presence of species identified by the Natural Heritage Program.

Similar protection is also afforded by the Coastal Resources Management Act to plants in estuaries, dunes, and other coastal habitats.

SUMMARY

For the past several years a tremendous amount of field work has been directed toward Rhode Island's rare and endangered plants. Many individuals have contributed their observations to the Natural Heritage Program data base, making it the largest and most comprehensive repository of rare and endangered plant information in the state. As new information is provided and studies continue, this evaluation of the state's flora will attain greater precision.

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